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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/709,652	05/20/2004	Michael P. Belyansky	FIS920040047US1	3651

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EXAMINER	
LINDSAY JR, WALTER LEE	

ART UNIT	PAPER NUMBER
2812	

DATE MAILED: 11/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/709,652	BELYANSKY ET AL.	
	Examiner	Art Unit	
	Walter L. Lindsay, Jr.	2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *10-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *11,12,14,17,21-25 and 27-29* is/are allowed.

6)☒ Claim(s) *10,13, 15-16, 18-20, 26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

This Office Action is in response to an Election filed 5/12/2005.

Currently, claims 1-20 are pending. Claims 1-9 have been canceled.

Specification

1. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 26 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 17, the reduced dielectric constant greater than 3.85, but claim 26 recites that the dielectric constant is less than 3.85, both statements can not be true.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 10, 13, 15-16 and 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yu (U.S. Patent No. 6,297,115, dated 10/2/2001) in view of Yu (U.S. Patent No. 6,194,748, dated 2/27/2001).

Yu (115) shows the method substantially as claimed in Figs. 5-7 and corresponding text as: depositing a dielectric material (32) (col. 4, lines 20-29); etching the dielectric material to form a spacer (32)(col. 4, lines 20-29); and depositing a thin layer (52) over the dielectric material (col. 5, line 62-col. 6, line 13) (claim 10). Yu (115) teaches that the thin layer comprises oxide (col. 5, line 62-col. 6, line 13) (claim 19).

Yu (115) shows the method substantially as claimed and as described in the preceding paragraph.

Additionally, Yu teaches: the spacer, further comprising depositing a thin layer on the spacer to prevent moisture absorption (oxide layers formed over structures are use to prevent moisture absorption)(col. 5, line 62-col. 6, line 13) (claim 18).

Yu (115) lacks anticipation only in not explicitly teaching that: 1) forming pores in the dielectric material; and depositing a thin layer over the porous dielectric material (claim 10); 2) the spacer comprise a Si-O-C-N type of low-k material (claim 13); 3) the

spacer has a reduced dielectric constant (k) (claim 15); 4) the reduced dielectric constant (k) is less than 3.85 (claim 16); and 5) the spacer is porous, and further comprising depositing a thin layer on the spacer to prevent moisture absorption (claim 18).

Yu (748) shows a MOSFET with porous sidewall spacers. Yu shows a spacer (38) that is formed of a porous material with a dielectric constant less than 3.0 but greater than 2.0 (xerogels or aerogels) (col. 4, lines 44-62). This structure aids in eliminating gate-edge fringing field effect, which can adversely affect the ability of the gate conductor to couple to the channel and to the source/drain extensions and also degrade the control of charges in the channel by the gate stack, thereby degrading sub-threshold characteristics of the transistor (col. 2, lines 15-32).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify the method shown in Yu (115), forming the spacers of a porous dielectric material, with a dielectric constant (k) is less than 3.85, as taught by Yu (748), with the motivation that Yu teaches the elimination gate-edge fringing field effect, which can adversely affect the ability of the gate conductor to couple to the channel and to the source/drain extensions and also degrade the control of charges in the channel by the gate stack, thereby degrading sub-threshold characteristics of the transistor.

7. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yu (U.S. Patent No. 6,297,115, dated 10/2/2001) in view of Yu (U.S. Patent No. 6,194,748, dated

2/27/2001) as applied to claim 10 above, and further in view of Mandelman et al. (U.S. Patent No. 6,429,477 dated 8/6/2002).

Yu (115) as modified by Yu (748) shows the method substantially as claimed and as described in the preceding paragraph.

Yu (115) as modified by Yu (748) lacks anticipation only in not explicitly teaching that: 1) the thin layer has a thickness of less than 5 nm (claim 20).

Mandelman shows a transistor device that incorporates thin layers. Thin layer (230) is formed over sidewall spacer (228) (col. 5, lines 24-32); the thin silicon oxide layer is formed between the thicknesses of 2nm-5nm (col. 5, lines 42-54). This allows the transistor to be formed with self-aligned body contact this minimizes tolerances need while minimizing process complexity.

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify the method shown in Yu (115) as modified by Yu (748), by forming the thin layer with a thickness of less than 5 nm, as taught by Mandelman, with the motivation that Mandelman teaches that the thin layer allows the transistor to be formed with self-aligned body contact this minimizes tolerances need while minimizing process complexity.

Allowable Subject Matter

8. Claims 11, 12, 14, 17, 21-25 and 27-29 are allowed.

9. The following is a statement of reasons for the indication of allowable subject matter: the prior art, either singly or in combination fails to anticipate or render obvious, the limitations of:

...wherein the spacer is made porous by exposing the spacers to an oxygen plasma, as required by claim 11;

...wherein the spacer comprises organic material; and

the spacer is made porous by removing the organic material, as required by claim 12;

...wherein the pores are formed during the spacer etch, rather than during deposition of the dielectric material, as required by claim 14; and

...wherein the reduced dielectric constant (k) is less than 7.0, but greater than 3.85, as required by claim 17.

Response to Arguments

10. Applicant's arguments filed 9/7/2005 have been fully considered but they are not persuasive. The present invention doest preclude the removal of the oxide layer. Oxide layers provide moisture protection, which is an inherent feature of oxide layers.

Conclusion

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Walter L. Lindsay, Jr. whose telephone number is (571) 272-1674. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael S. Lebentritt can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Walter L. Lindsay, Jr.
Examiner
Art Unit 2812

WLL
November 23, 2005